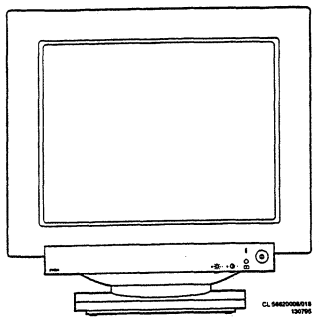
21" Autoscan Colour Monitor

Chassis CM0900

(21BA9029/00S HI-CM0900PH/HI)

Service
Service
Service



Service Manual

Horizontal frequencies
30 to 107 KHz

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PHILIPS

1. Technical data

General

-	Mains voltage	: 80 - 135V or 170 - 270V
-	Mains frequency	: 47 - 63Hz
-	Power consumption	: 180 W
-	Operating temperature	: 5°C to 35°C
-	Weight	: 37 kg
-	Dimensions (H, W, D)	: 499x528x540 mm
-	Video signal	: 0.714 Vp-p 75 Ω / high impedance (selectable)

Sync. signal

-	Separate sync.	: TTL-level
-	Composite sync.	: TTL-level
-	Composite sync.	: on Green

Picture tube

-	Size	: 21 inch (flat)
-	Light transmission	: 51 %
-	EHT voltage	: 27,5 kVolt
-	Pitch	: 0.26 mm

Video

-	Dot rate	: 250 MHz
-	Image area:	
	* horizontal	: 406.4 mm
	* vertical	: 304.8 mm
-	Vertical frequency	: 50 - 170 Hz
-	Vertical sync. polarity	: positive or negative
-	Horizontal frequency	: 30 to 107 kHz
-	Horizontal sync. polarity	: positive or negative
-	Resolution	: up to 1600x1280 at 80 Hz refresh rate
-	Misconvergence	: 0.25 mm in the center 0.35 mm in the corners

Preset modes

-	Number of preset modes	: 32 (12 factory presets)

(Technical data are subject to change without notice)

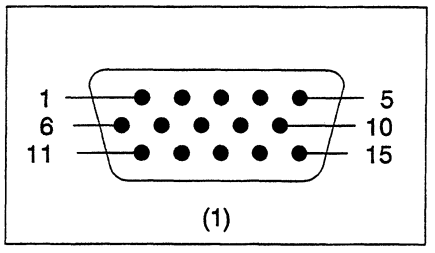
FACTORY PRE-SET VIDEO TIMINGS

Item	Unit	VGA-1 640x480 VGA	VGA-2 640x400 VGA/2	VESA-2 800x600 VESA/75	ST50-75 832x624 75 Hz	VESA-3 1024x768 EVGA	VESA-4 1024x768 VESA/75
Pixel rate	MHz	25.175	25.175	49.5	57.28	75	78.75
Hor. Freq.	kHz	31.468	31.468	46.875	49.7	56.47	60.023
Vert. Freq.	Hz	59.94	69.93	75	75.18	70.07	75.029
Horiz. Res.	pixels	640	640	800	832	1024	1024
Vert. Res.	lines	480	400	600	624	768	768
H. Period	pixels	800	800	1056	1152	1328	1312
H. Blank	pixels	160	160	256	320	304	288
H. Fr. Prc.	pixels	16	16	16	32	24	16
H. Sync. width	pixels	96	96	80	64	136	96
Interlace	Y / N	N	N	N	N	N	N
V. Period	lines	525	525	625	667	806	800
V. Blank	lines	45	45	25	43	38	32
V. Fr. Prc.	lines	10	10	1	1	3	1
V. Sync. width	lines	2	2	3	3	6	3
S.O.G.	Y / N	N	N	N	N	N	N
H. Sync. Pol.	+ / -	-	-	+	-	+	+
V. Sync. Pol.	+ / -	-	+	+	-	+	+
H. Width	mm	356	380	380	356	380	380
V. Height	mm	285	285	285	267	285	285

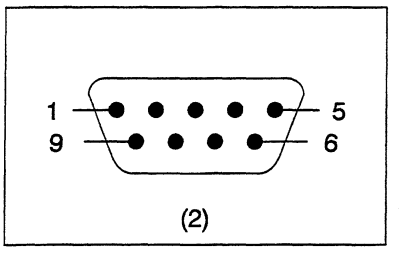
Item	Unit	VESA-5 1024x768 75 Hz	SMAC-2 1152x870 75 Hz	VESA-6 1280x1024 VESA/75	VESA 1600x1200 75 Hz	VESA 1600x1200 80 Hz	FIMI 1600x1280 76 Hz
Pixel rate	MHz	80	100	135	202.5	216	217.0414
Hor. Freq.	kHz	60.241	68.68	79.976	93.75	100	101.232
Vert. Freq.	Hz	74.93	75	75.025	75	80	76
Horiz. Res.	pixels	1024	1152	1280	1600	1600	1600
Vert. Res.	lines	768	870	1024	1200	1200	1280
H. Period	pixels	1328	1456	1688	2160	2160	2144
H. Blank	pixels	304	304	408	560	560	544
H. Fr. Prc.	pixels	32	32	16	32	32	48
H. Sync. width	pixels	96	128	144	192	192	160
Interlace	Y / N	N	N	N	N	N	N
V. Period	lines	804	915	1066	1250	1250	1332
V. Blank	lines	36	45	42	50	50	52
V. Fr. Prc.	lines	3	3	1	1	1	3
V. Sync. width	lines	3	3	3	3	3	3
S.O.G.	Y / N	N	N	N	N	N	N
H. Sync. Pol.	+ / -	-	-	+	+	+	+
V. Sync. Pol.	+ / -	-	-	+	+	+	+
H. Width	mm	380	380	356	380	380	356
V. Height	mm	285	285	285	285	285	285

2. Connection facilities

Pin assignment 15p "D" shell (3 rows)



Pin assignment 9p "D" shell (2 rows)



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INPUT- OUTPUT SIGNALS

15 pins D-Shell connector (video)

Pin	Assignment	Sensitivity	Terminal impedance
1	Red video input	RGB-analog	75 Ω
2	Green video input/ sync. on green	RGB-analog	75 Ω
3	Blue video input	RGB-analog	75 Ω
4	Ground		
5	Ground		
6	Red video ground		
7	Green video ground		
8	Blue video ground		
9	+5 EXT		
10	Logic ground		
11	Identify output (connected to 10)		
12	SDA (DDC Dedicated Line)		
13	Horizontal sync. (or Hor. + Vert. sync.)	TTL Level L = 0-0.8V H = 2.4 -5V	2.2 Ωk pull down
14	Vertical sync.	TTL Level L = 0-0.8V H = 2.4 -5V	2.2 Ωk pull down
15	SCL (DDC Dedicated Line)		

9 pins D-Shell connector (RS 232)

Pin	Assignment
1	-
2	Receiver data
3	Transmitter data
4	-
5	GND
6	-
7	-
8	-
9	+5V

3. Warnings and Notes

Safety Instructions for Repairs

1. Safety regulations require that during a repair:
- the set should be connected to a ground (earthed) AC outlet by means of the power cord provided by the manufacturer
- the AC outlet must be provided with a GFCI (Ground Fault Circuit Interruptor)
- safety components, indicated by the symbol ⚠, should be replaced by components identical to the original ones
- when replacing the CRT, safety goggles must be worn.

2. Safety regulations require also that after a repair:
- the insulation of the mainslead should be checked for external damage
- the cableform and EHT cable are routed correctly and fixed with the mounted cable clamps in order to avoid touching of the CRT, hot components or heat sinks
- thermally loaded solder joints should be resoldered. This includes components like LOT, the line output transistor, fly-back capacitor
- on each monitor the following test procedure has to be applied:

Ground Continuity test

Equipment Required:
1) An AC source capable of 12 Vac maximum (open circuited) and 25 Amps continuous (current limited) with a built-in ammeter.
2) A digital voltmeter (DVM) if the AC source does not have a built-in voltmeter.

Procedure:
1) Connect the AC source between these two contact points:
   A. The ground pin of the AC input connector.
   B. The grounded shell of the input signal connector.
2) Turn the supply on.
3) Measure and record the voltage drop between these two contact points on the DVM.
4) Measure and record the current flowing between the two contact points.
5) Turn off the AC source.
6) Calculate the resistance between the two contact points. It must not exceed 0.1 Ohms.

NOTE: If this test indicates a resistance of over 0.1 Ohms, the monitor fails the Ground Continuity test and must be repaired/checked.

Dielectric withstand test

Shortcircuit the Line and Neutral of the AC power inlet of the monitor. Apply V=1500Vrms between the ground and the line/neutral. The voltage shall be gradually raised from zero (0) to the prescribed voltage and held at that value for at least one (1) second. No hazards may occur. Remove the shortcircuit.

Maintenance Instructions

It is recommended to have a maintenance inspection carried out periodically by a qualified service employee. The interval depends on the usage conditions.
- During the maintenance inspection the above mentioned "safety instructions for repair" should be carried out. The power supply and deflection circuitry on the chassis, the CRT panel and the neck of the CRT should be cleaned.

When cleaning the monitor on the outside:
- Always disconnect the monitor from the mains.
- Always use a damp AND NOT WET lint-free cloth
- To clean the screen, apply a household glass cleaner to a cloth and then wipe the screen.
- Do not use solvents or abrasives on the monitor. It might discolour the cabinet and/or affect the anti glare treatment on your screen.

Warnings

1. In order to prevent damage to **ICs** and transistors, all high-voltage flash-overs must be avoided. In order to prevent damage to the picture tube, the method shown in Fig. 3.1 should be used to discharge the picture tube. Use a high-voltage probe and a multimeter (position DC-V). Discharge until the meter reading is 0V (after approx. 30s).

2. **ESD** ⚠

All **ICs** and many other semiconductors are sensitive to electrostatic discharges (ESD). Careless handling during repair can drastically shorten the life. Make sure that during repair you are connected by a pulse band with resistance to the same potential as the earth of the unit. Keep components and tools also at this same potential.

3. Be careful when taking measurements in the high-voltage section and on the picture tube panel.

4. It is recommended that safety goggles are worn when replacing the picture tube.

5. When making settings, use plastic rather than metal tools. This will prevent any short-circuit and the danger of a circuit becomes unstable.

6. Never replace modules or other components while the unit is switched on.

7. Together with the deflection unit the picture tube is used as an integrated unit. Adjustment of this unit during repair is therefor not recommended.

Notes

1. The semiconductors indicated in the circuit diagram(s) and in the parts lists are completely interchangeable per position with the semiconductors in the unit, irrespective of the type indication on these semiconductors.

2. The direct voltages and oscillograms are average voltages. They have been measured by using the service test software and under the following conditions:
- Signal pattern : grey scale.
- Mode: VGA (640 * 480) 31,5kHz/60Hz.
- Contrast and Brightness to maximum.

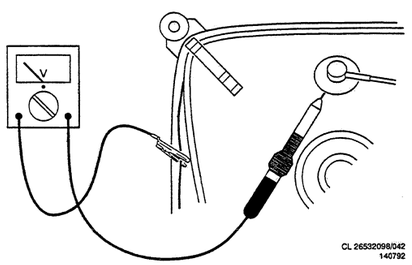


Fig. 3.1

4. Mechanical instructions

General

To be able to perform measurements on the circuit boards, the unit should placed in the service position first. For the location of the circuit boards and the item numbers mentioned in this chapter we refer to the exploded view drawing.

Rear cover, item 101
- Remove the screws , item 112 (4x)
- The rear cover can now be removed.

Top screening, item 37
- Remove the screws item 24 (4x).
- The screening can now be removed.

Screening left, item 5
- Remove the screws item 8 (5x).
- The screening with the board, can now be pulled backwards.
- The "SMPS + EHT Generator" and the "AC/DC Converter" are then reachable.

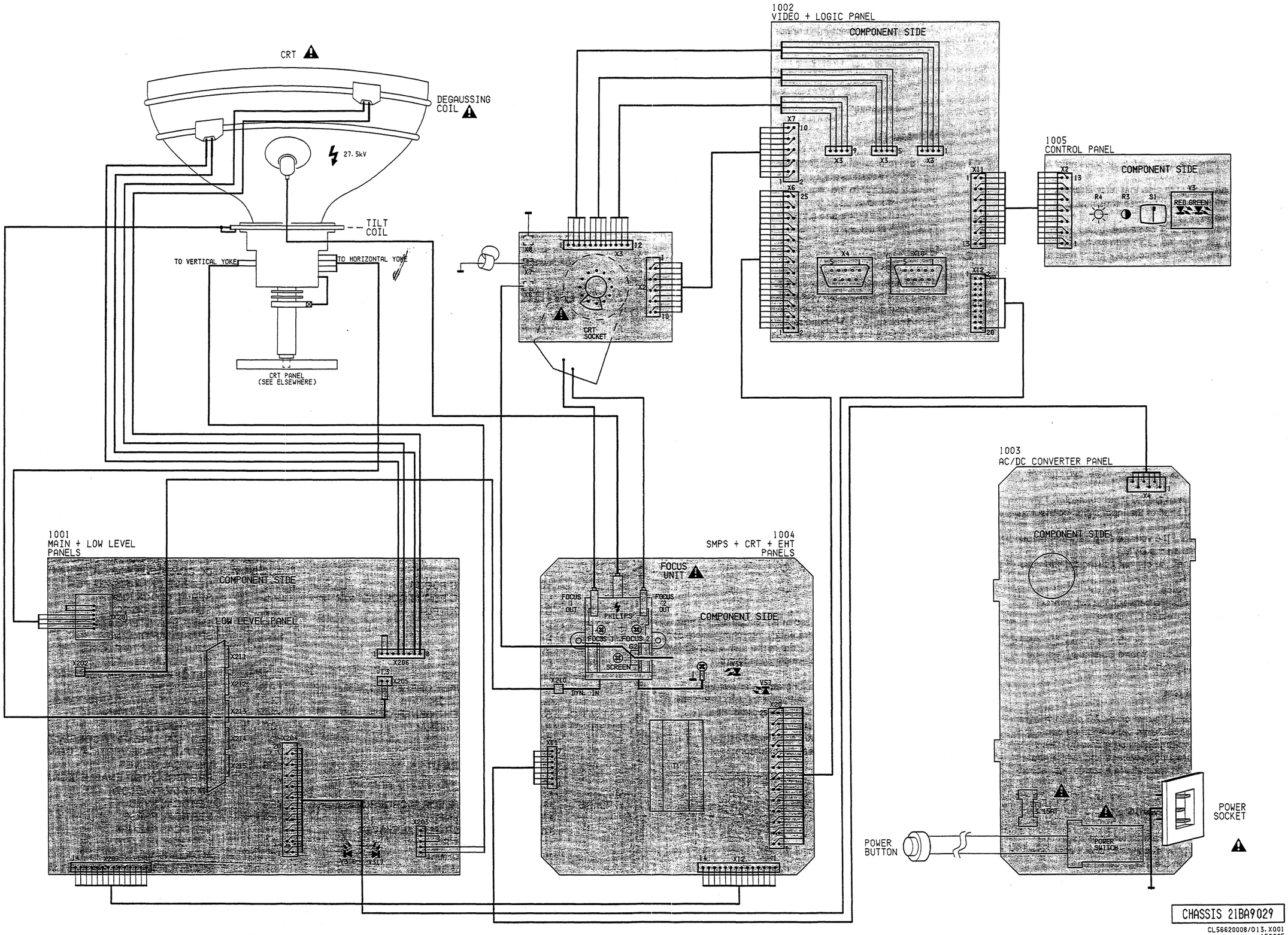
Screening right, item 51
- Remove the screws item 7 (5x).
- The screening with the board, can now be pulled backwards.
- The "Main Boards" are then reachable.

Rear screening with input sockets, item 11
- Remove the screws item 10 (4x)
- The screening with input sockets can now be pulled backwards.
  Remark: By leaving the wire trees connected, the monitor is still working.
- The "Video/Logic Panel" and "CRT Panel" are than reachable.

Abbreviations

A	HOR PH.-VERT.PH.AND HOR.FR. SIGNALS
AA	CENT.-KEYB.-PAR.-CORN.-E/W-BAL. AND WIDHT SIGNALS
ABL	BEAM CURRENT INDICATION FOR BEAM LIMITED CIRCUIT
BAL	BALANCE SIGNAL CORRECTION
BDSER	BUFFERED DISPLAY SERIAL
BDSTD	BUFFERED DISPLAY STROBE DATA
BPL	BUFFERED PARALLEL LOAD
BRIG	BRIGHTNESS
BSDO	BUFFERED SERIAL DATA OUT
CENT	CENTER SIGNAL CORRECTION (E/W CENTRAL CORRECTION)
CLAMP	BACKPORH SIGNAL FOR VIDEO AMP. DC RESTORATION
CONT	CONTRAST
CORN	CORNERS SIGNAL CORRECTION
DCLK	DATA CLOCK
DEG	DEGAUSS
DEN	DISPLAY ENABLE
DF	VERTICAL DYNAMIC FOCUS
DFF	VERTICAL DYNAMIC FOCUS CORRECTION
DFOUT	DYNAMIC FOCUS OUTPUT
DOUT 1	DATA OUT 1
DOUT 2	DATA OUT 2
DSTB	STROBE SIGNAL
DYN IN	DYNAMIC FOCUS IN
DYN OUT	DYNAMIC FOCUS OUT
E/W	EAST/WEAST SIGNAL CORRECTION (PIN-CUSHION CORRECTION)
EHT SYNC	SYNC. SIGNAL TO EHT GENERATOR
EX STBY	PWM SLOW START SIGNAL
F1	FOCUS 1
F2	FOCUS 2
G.VIDEO	BUFFER G. VIDEO INPUT
G1	GRID 1
G2	GRID 2
H PULSE	HORIZONTAL PULSE FOR MICROPROCESSOR FREQUENCY READING
HD	OUTPUT STAGE HORIZONTAL DRIVER
HDR	HORIZONTAL DRIVER
HF	HORIZONTAL FAILURE
HFB	HORIZONTAL FLYBACK
HL	HORIZONTAL LINEARITY
HLF	HORIZONTAL LINEARITY FEEDBACK
HOR FREQ	HORIZONTAL FREQUENCY
HOR PH	HORIZONTAL PHASE
HSH	HORIZONTAL SHIFT
HSHF	HORIZONTAL SHIFT FEEDBACK
HVEN	ENABLE SIGNAL FOR HIGH VOLTAGE GEN. (ACTIVE HIGH)
HVON	HIGH VOLTAGE ON
KBDIN	KEYBOARD IN
KEY	KEYSTONE SIGNAL CORRECTION
LLD	LOAD
N.C.	NOT CONNECTED
OFF1-2	POWER SUPPLY OFF SIGNALS
OL	OUT OF LOCK
PAR	PARALLELOGRAM SIGNAL CORRECTION
PREN	PREREGULATOR ENABLE SIGNAL FROM LOGIC (ACTIVE LOW)
PRGFL	FLASH EPROM PROGRAMMING ENABLE
PWR-OFF	POWER OFF COMMAND
RGB	VIDEO INPUTS
RGB CUTOFF	DC CONTROL FOR CUTOFF ADJUSTMENT
RGB DATA	SLICED RGB VIDEO SIGNALS (TTL LEVEL)
RGB DRIVE	DC CONTROLS FOR DRIVE ADJUSTMENT
RX	RECEIVE DATA (RS 232 PORT)
SCL	SERIAL CLOCK (DDC)
SDA	SERIAL DATA (DDC)
SDO	SHIFT REGISTER DATA OUT
SG	SPARE GAP GROUND
ST BY	STAND BY (ACTIVE LOW)
TILT	TILT SIGNAL DRIVER
TILTF	TILT SIGNAL DRIVER FEEDBACK
TTLS	TTL SYNCRO
TX	TRANSMIT DATA (RS232 PORT)
VBLK	VERTICAL BLANKING
VCC	+400V DC BUS
VD	VERTICAL LINEARITY CORRECTION SIGNAL
VD1	OUTPUT STAGE VERTICAL DRIVER
VDR	VERTICAL DRIVER
VE	PREREGULATOR ENABLE SIGNAL FROM SMPS (ACTIVE LOW)
VER	VERTICAL SYNC
VER PH	VERTICAL PHASE
VF	VERTICAL FAILURE
VPOL	VERTICAL POLARITY
VS	AUXILIARY VOLTAGE
VST-UP	START-UP VOLTAGE (POWER SUPPLY)
WIDTH	WIDTH SIGNAL CORRECTION

5. Wiring diagram



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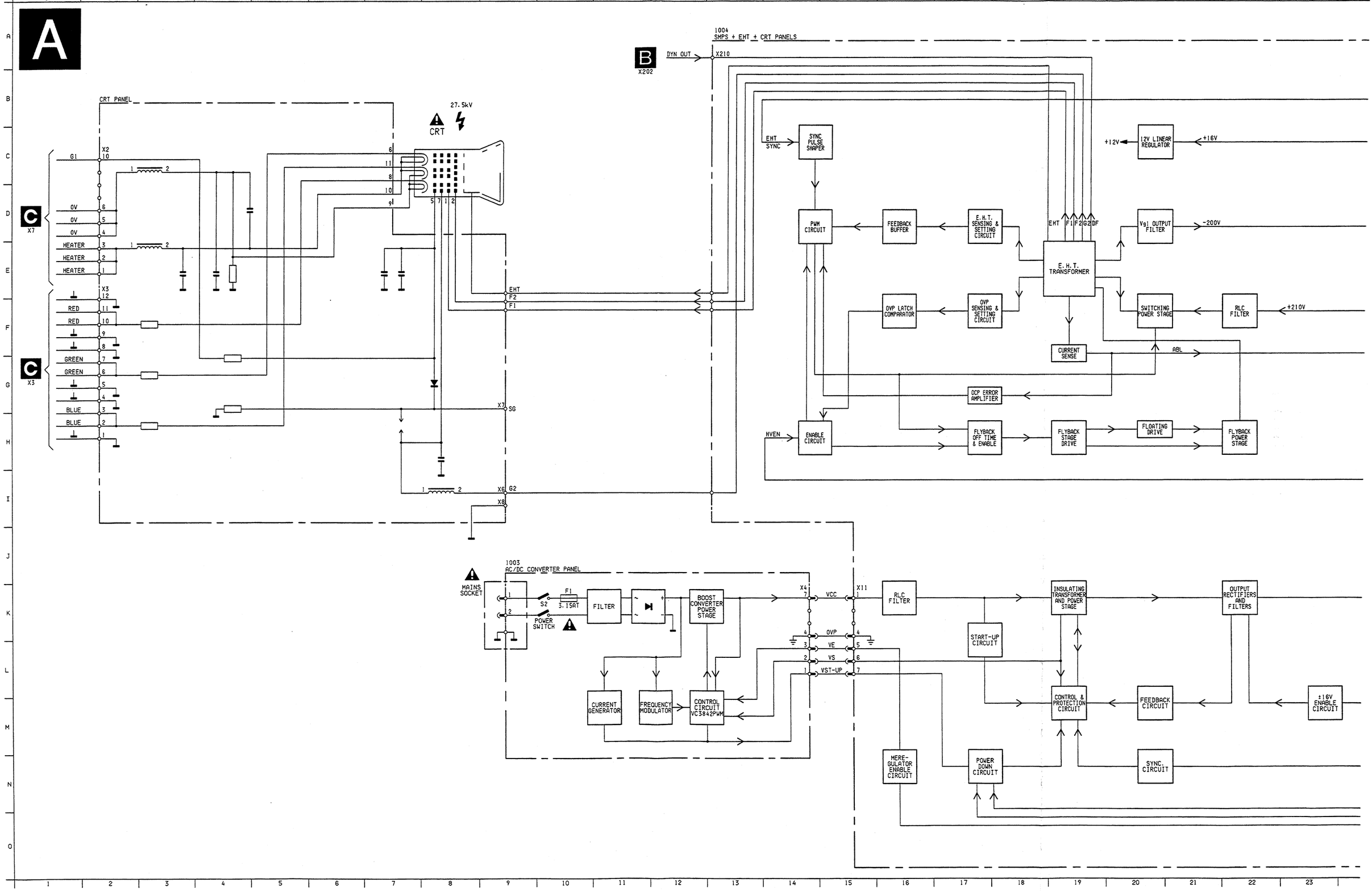
6. Functional block diagram A



1004
SMPS + EHT + CRT PANELS

B X202

DYN OUT → X210

EHT SYNC → SYNC PULSE SHAPER

PWM CIRCUIT ← FEEDBACK BUFFER ← E.H.T. SENSING & SETTING CIRCUIT

OVP LATCH COMPARATOR ← OVP SENSING & SETTING CIRCUIT

E.H.T. TRANSFORMER

EHT F1 F2 G2 DF

Vg1 OUTPUT FILTER → -200V

SWITCHING POWER STAGE ← RLC FILTER ← +210V

CURRENT SENSE → ABL

OCP ERROR AMPLIFIER

HVEN → ENABLE CIRCUIT

FLYBACK OFF TIME & ENABLE → FLYBACK STAGE DRIVE → FLOATING DRIVE → FLYBACK POWER STAGE

+12V ← 12V LINEAR REGULATOR ← +16V

X12
1 +210V
2 ST-BY
3
4 +8V
5
6 +8V
7
8 -16V
9
10 +16V
11
12 EHT-SYNC
13
14 +80V

B X207

X20
25 -200V
24 ABL
23
22 HVEN
21
20
19
18 +80V
17 +80V
16
15
14 +16V
13 +16V
12
11
10 -16V
9 -16V
8
7
6 +8V
5 +8V
4 PREN
3 +8V
2 OFF2
1 OFF1

C X6

VERTER PANEL

S2 POWER SWITCH

F1 3.15AT → FILTER → BOOST CONVERTER POWER STAGE

X4 7 VCC → X11 1

4 OVP → 4
3 VE → 5
2 VS → 6
1 VST-UP → 7

CURRENT GENERATOR
FREQUENCY MODULATOR
CONTROL CIRCUIT VC3842PWM

RLC FILTER → INSULATING TRANSFORMER AND POWER STAGE → OUTPUT RECTIFIERS AND FILTERS

START-UP CIRCUIT

CONTROL & PROTECTION CIRCUIT ← FEEDBACK CIRCUIT ← ±16V ENABLE CIRCUIT

MERE-GULATOR ENABLE CIRCUIT

POWER DOWN CIRCUIT

SYNC. CIRCUIT

CHASSIS 21BA9029

CL56620008/014.AREF
190695

A

1 X302-13
1V / div DC
10µs / div

10 X310
10V / div DC
10µs / div

2 X302-14
1V / div DC
5ms / div

11 X311
10V / div DC
10µs / div

3 X302-2
0.2V / div DC
10µs / div

4 X302-3
0.2V / div DC
10µs / div

5 X302-1
0.2V / div DC
10µs / div

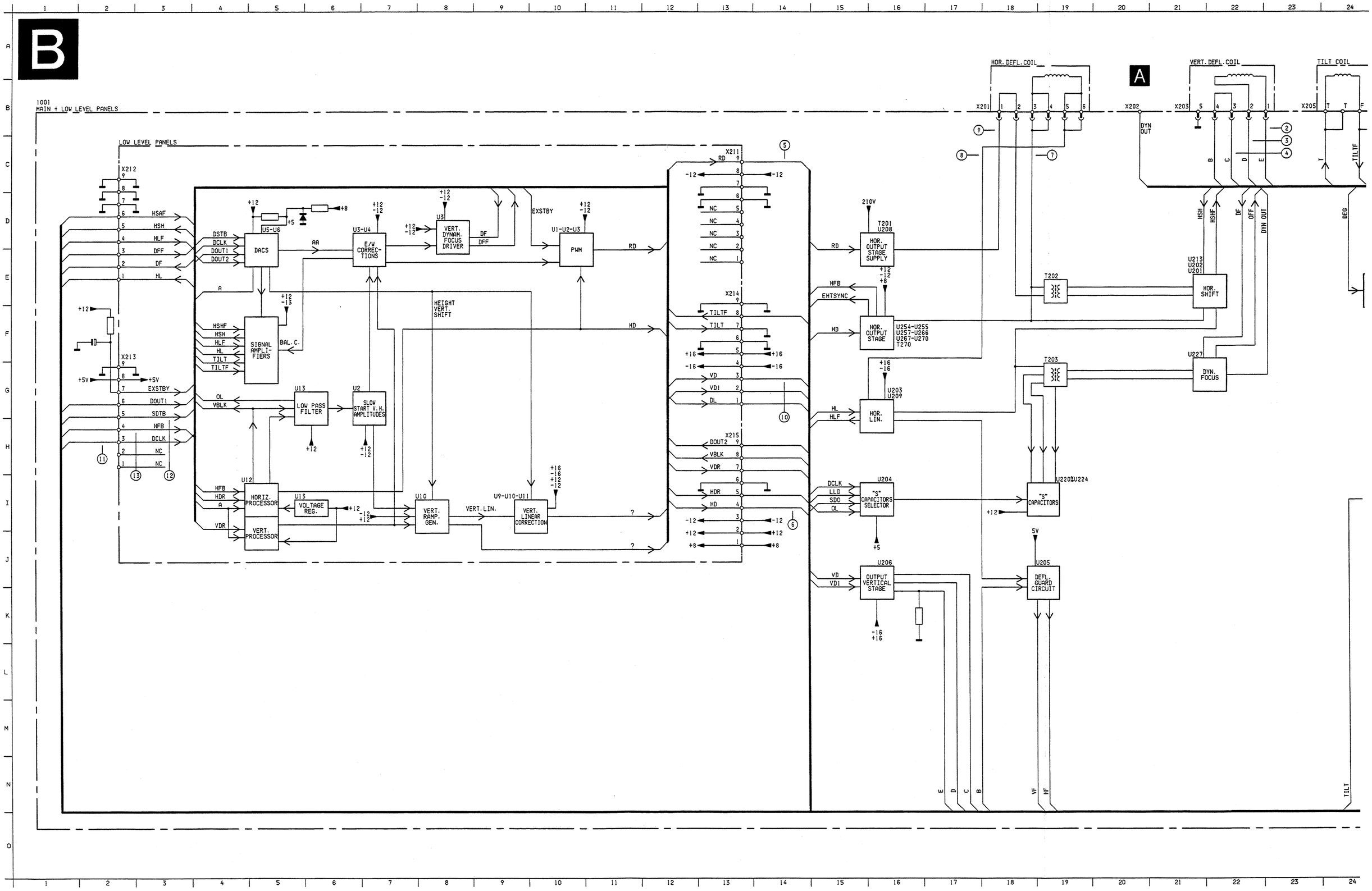
6 X301-8
2V / div DC
10µs / div

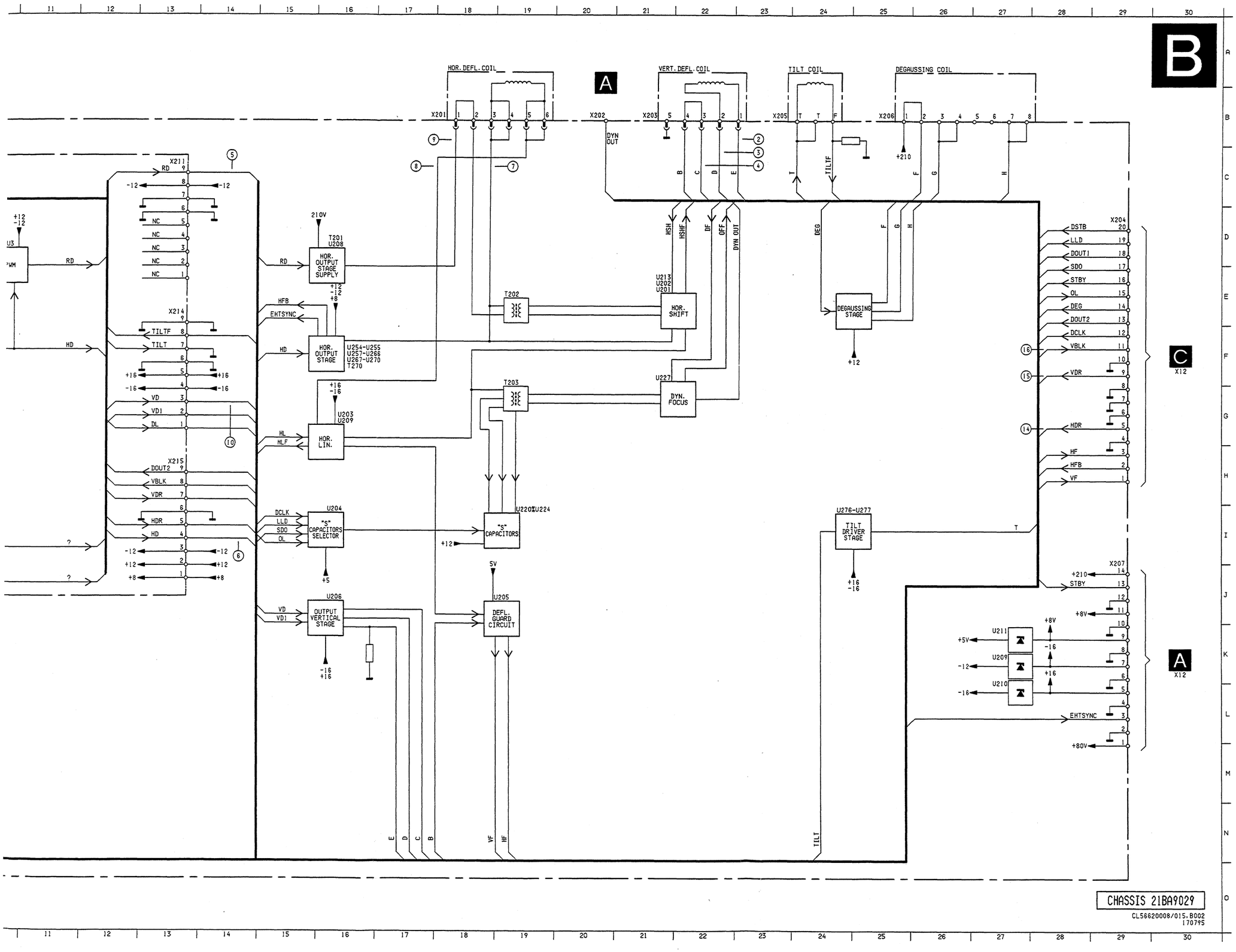
7 X301-9
2V / div DC
5ms / div

8 X301-18
2V / div DC
10µs / div

9 X309
10V / div DC
10µs / div

Functional block diagram B





2 X203-1
0.5V / div AC
5ms / div

11 X213-3
1V / div AC
500µs / div

3 X203-2
10V / div AC
5ms / div

12 X213-5
1V / div AC
5µs / div

4 X203-3
10V / div AC
5ms / div

13 X213-4
2V / div AC
10µs / div

5 X211-9
2V / div AC
10µs / div

14 X204-5
1V / div DC
10µs / div

6 X215-4
2V / div AC
10µs / div

15 X204-9
1V / div AC
5ms / div

7 X811-1
0.1kV / div DC
10µs / div

16 X204-11
1V / div AC
5ms / div

8 X811-3
50V / div AC
10µs / div

9 X811-5
50V / div AC
10µs / div

10 X214-3
200mV / div AC
5ms / div

Functional block diagram C

C

1002
VIDEO + LOGIC PANEL

X12
20 DSTB
19 LLD
18 DOUT1
17 SDO
16 STBL
15 OL
14 DEG
13 DOUT2
12 DCLK
11 VBLK
10
9 VDR
8
7
6
HDR 5
4
HF 3
HFB 2
VF 1

B
X204

X6
25 -200V → -200V
24 ABL → ABL
23 NC
22 HVEN → HVEN
21
20
19
18 +80V → +80V
17 +80V
16
15
14 +16V → +16V
13 +16V
12
11
10 -16V → -16V
9 -16V
8
7
6 +8V
5 +8V
4 PREN → PREN
3 +8V → +8V
2 OFF2 → OFF2
1 OFF1 → OFF1

A
X20

U105 SHIFT REV: SDO, STBY, DEG, LLD, DCLK → PWR OFF, BSDO, HVEN, PREN

U106 +16V → +12V
U107 -16V → -12V
U108 +8V → +5V

U209 I²C BUS: SCL, SDA, VER, +5EXT

U208-U220 U221-U222 U223 POWER OFF CIRCUITRY: X, PWR OFF, H SYNC → OFF1, OFF2

U301-U302 OUTPUT BUFFERS: DSTB, DOUT, DCLK, DOUT2, DOUT1, LLD, BSDO

U305 MICRO-CONTROLLER 80C552: CONT, KBDIN, BRIG, ADO-7, ALE, A8-15, TX, RX, CAPT 1, CAPT 0, WR, RD, PSEN

U312 LATCH A/D LE

U318 VFE FLASH EPROM 512K DE, HR

V306-V307 FLASH EPROM PROGRAMMING SWITCH: 12V, PRGFL

U323 SERIAL RS232 INTERFACE: TX, RX

U313

U304 /64: H PULSE, VDR

U314 DECODER: PRGFL, EN1

U320 EEPROM OK: CE, OE, HR

U324 RESET

V116 EHT ON INDIC.: HVON, -200

U321 INPUT BUFFER: OE, CE

U202 R VIDEO → R DATA
U202 G VIDEO → G DATA
U203 B VIDEO → B DATA

U315-U317 U308&U311 SOFT CONTROL DECODER

U322 LATCH: CK, OE, CE

OL, VF, HF, VPOL, TILS

G1 CIRCUIT: GRID1, VBLK, HF, VF, OL → BRIG, RESET

U102 AUTOM. BEAM LIMITER: DCLK, DSTB, DOUT, ABL

U103 DIGITAL ANALOG CONV. 8 BIT: → R-DRIVE, G-DRIVE, B-DRIVE

U101 LEVEL SHIFT: R-CUTOFF, G-CUTOFF, B-CUTOFF

U1/ LM1201/N PRE AMPL. GAIN CONTR. BT. LEVEL CLAMP → V13-V14 GAIN BUFFER → U4/ LR3424F OUTPUT AMPL.

U2 PRE AMPL. GAIN CONTR. BT. LEVEL CLAMP → V15-V16 GAIN BUFFER → U5 OUTPUT AMPL.

U3 PRE AMPL. GAIN CONTR. BT. LEVEL CLAMP → V17-V18 GAIN BUFFER → U6 OUTPUT AMPL.

CLAMP, B, G, R, G VIDEO, H SYNC., V SYNC.

U201-U205 U206-U207 SYNC. DECODER: HDR, VDR, HPULSE, CLAMP, TILS, VPOL, HFB, STBY

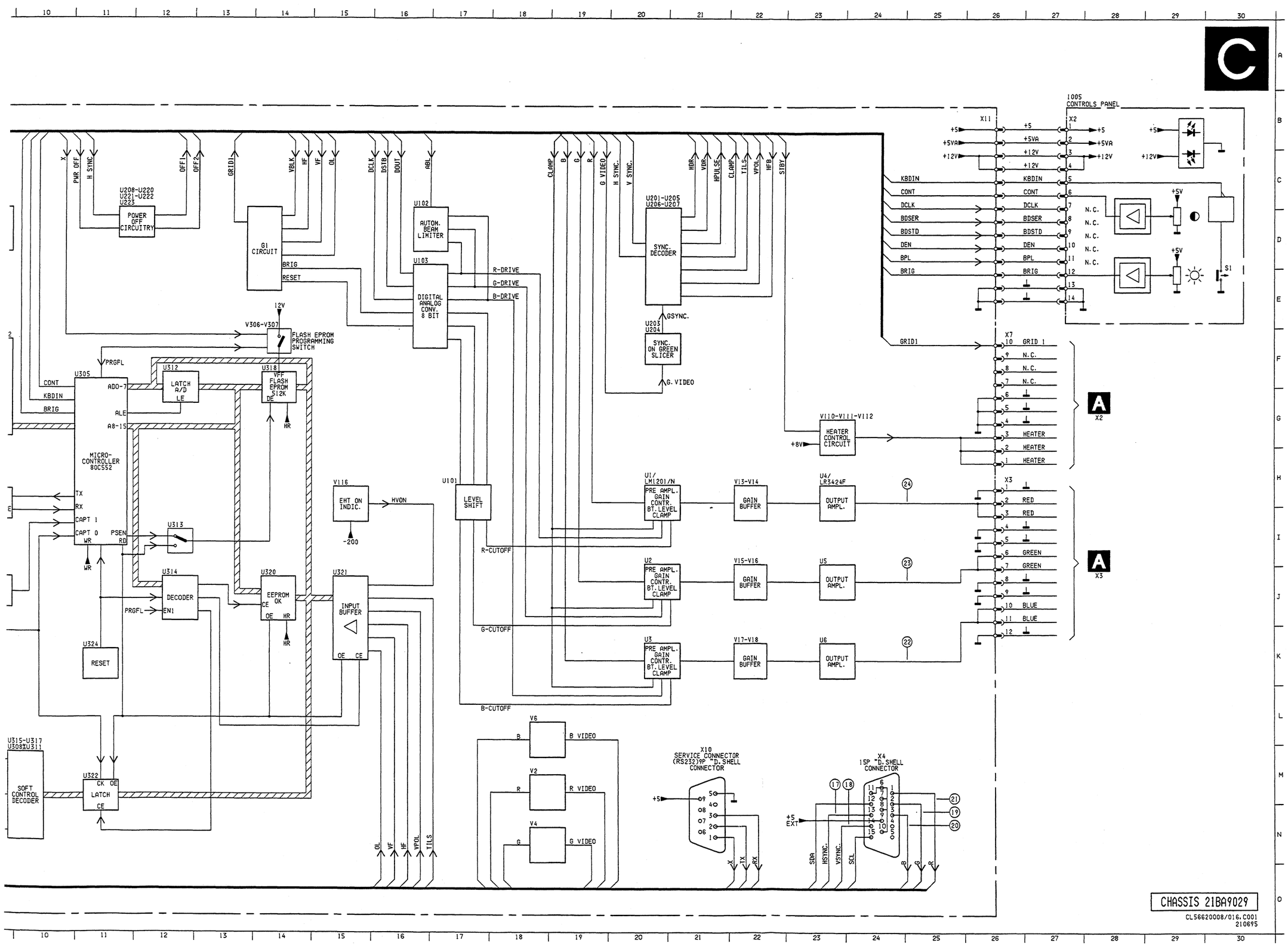
U203 U204 SYNC. ON GREEN SLICER: GSYNC. → G. VIDEO

V110-V111-V11 HEATER CONTROL CIRCUIT: +8V

V6 B → B VIDEO
V2 R → R VIDEO
V4 G → G VIDEO

X10 SERVICE CONNECTOR (RS232) 9P "D" SHELL CONNECTOR: +5, 5, 9, 4, 8, 3, 7, 2, 6, 1; X, TX, RX

+5 EXT, 17, 18; SDA, HSYNC., VSYNC., SCL



17 X4-13
1V / div DC
10µs / div

18 X4-14
1V / div DC
5ms / div

19 X4-2
0.2V / div DC
10µs / div

20 X4-3
0.2V / div DC
10µs / div

21 X4-1
0.2V / div DC
10µs / div

22 X3-10
10V / div DC
10µs / div

23 X3-6
10V / div DC
10µs / div

24 X3-2
10V / div DC
10µs / div

7. Electrical adjustments

ADJUSTMENT NEEDED AFTER REPLACEMENT OF A F.R.U. (FIELD REPLACEMENT UNIT)

General
In general after swap a board (F.R.U.) no service adjustment are necessary. Only in some worst case situation as Video + Logic panel and after CRT replacement, readjustments have to be executed. Adjustment as chromaticy and geometry are controlled via the 'Interactive Soft-ware for your monitor 21BA' (enclose in each set into the User Manual). Whatever for **complete geometry adjustments an external software** is available on floppy disk **(CM0900 TEST SOFTWARE - Service codes 4822 727 20653)**. This software can be applied to the monitor via a computer with RS232 output port. Also a standard 9 pin "D-shell female" to 9 pin "D-shell"l male connection cable (service code 4822 321 21988) is needed to connect the computer to the 9 pin "D-shell" socket (female) at the rear of the monitor on the Video + Logic panel.

1. **Main + Low level panels**
- The Low level panel contains the 'phase lock' circuit, its data are stored into the EEPROM U320 (28HC64) mounted into the Video + Logic panel. In case of replacement of the Low level panel the old 'phase lock data' must be reset using the specific command contained in the **'CM0900 TEST SOFTWARE'-Service code 4822 727 20653**
- Geometry adjustments

2. **Video + Logic panel**
The Flash EPROM U318 (28F512) and the EEPROM U320 (28HC64) mounted on the Video + Logic panel are empty, for this reason in case of replacement of this panel is necessary:
- to load the 'Firmware' (Service code 4822 900 21240) by using the external software (Flash.exe). This DOS software has to be applied through a special adapter (Service code 4822 219 82808) to the monitor via RS232.
- to perform all the geometry and chromaticy adjustments
- to restore and readjust all the factory timings

All of the above features can be performed using the **'CM0900 TEST SOFTWARE' -Service code 4822 727 20653**

3. **SMPS + EHT + CRT panels**
- Focus adjustment

4. **AC/DC converter panel**
- Basically no adjustments necessary

5. **Control panel**
- Basically no adjustments necessary

6. **C.R.T.**
- Geometry adjustments
- Focus adjustments
- Chromaticy adjustments

WARNING:
FOR CONTINUED COMPLIANCE OF THIS CHASSIS WITH FDA (FOOD & DRUGS ADMINISTRATION OF U.S.) X-RAY RADIATION PERFORMANCE STANDARD, CODE OF FEDERAL REGULATIONS 21 SUBCHAPTER J, IT IS ESSENTIAL THAT THE ANODE VOLTAGE AND THE HOLD-DOWN INTERVENTION THRESHOLD BE CHECKED AND RE-ADJUSTED AFTER ANY REPAIR OF EHT GENERATOR.

THIS SHEET CONSTITUTES THE "ATTACHEMENT E" OF THE "TELEVISION REPORTING FORM" SUBMITTED TO FDA (DHHS) FOR THIS CHASSIS.

FOLLOW THE PROCEDURE BELOW:

Measuring instrument needed: High Voltage Meter 40 Kvdc full range (max. uncertainty ± 100 V)

1. Desolder and remove the sealed trimmers R204 (HV adjustment) and R211 (Hold-down adjustment).
2. Replace both trimmers with identical ones (47 Kohm).
3. Set R204 fully counter-clockwise. Set R211 fully clockwise.
4. Connect the High Voltage meter to the CRT anode of the test chassis.
5. Switch the test chassis on.
6. Adjust clockwise R204 slowly to reach 30 KV (± 200V).
7. Adjust counter-clockwise R211 slowly untill the Hold down circuit operates (this is indicated by the HV Meter reading which drops to 0V).
8. Switch the test chassis off.
9. Set R204 fully counter-clockwise.
10. Switch the test chassis on.
11. Adjust clockwise R204 to reach 27.5KV ± 100V
12. Switch the test chassis off.
13. SEAL TRIMMERS R204 AND 211 WITH CYANOACRYL GLUE (e.g. LOCTITE 403 OR 406). NOTE THAT ONLY CYANOACRYLATE GLUES MUST BE USED.

8. Repair tips

TROUBLE SHOOTING BACKGROUNDS

When you are facing a problem, first of all try to understand which kind of problem it is and where it is coming from. If you can see a picture on the screen, usually you should able to understand the problem looking at the screen itself and take the appropriate corrective actions. When you find a problem looking at the screen, before changing any PCB, check if it is possible to solve the problem by readjusting the related controls. Many times, when you see the picture, the problem is not real failure but only a misadjustment since in most cases of failure (or incorrect operation) a protection circuit will blank the screen

For quick diagnosis there are two different levels of trouble shooting:

- **TROUBLE SHOOTING VIA MONITOR:**
- General
- Via front led
- Via LED on panels: additional trouble shooting indicators are the LED's placed on the MAIN and SMPS panels. By following this procedure, you should be able to find the defective board to be replaced.

- **TROUBLE SHOOTING VIA ADJUSTMENT & DIAGNOSTIC PACKAGE (CM0900 TEST SOFTWARE):** this diagnostic & adjustment software **(Service code 4822 727 20653)**, perform a test which is able to check if some important circuits are properly working, such as deflections, EHT and in case of failure an error message is displayed. By following this procedure, you should be able to find the defective board to be replaced.

8.1 TROUBLE SHOOTING VIA MONITOR

General trouble shooting

PROBLEM
One or two colours are missing
→ The video cable is not (or not properly) connected to the PC or to the monitor

PROBLEM
Coloured spot or bad colour purity appears on the picture
→ Press the degauss button
→ Electromagnetic interference is present: move any electromechanical device away from the monitor

PROBLEM
Incorrect picture size
→ Enlarge or reduce the horizontal and vertical size

PROBLEM
Incorrect picture position
→ Shift the horizontal or vertical position

PROBLEM
Picture distortion
→ Adjust the parallelogram, trapezoid, symmetry or pincushion distortions
→ Electromagnetic interference is present: move any electromechanical device away from the monitor

Trouble shooting via front LED

PROBLEM
No picture and the front LED doesn't come on when the main power button is switched on
→ The power cord is not (or not properly) connected to the power source (check the two ends)
→ No power at the wall outlet (check with other equipment)
→ Monitor or fuse are faulty

PROBLEM
No picture but the orange LED lights-up
→ The video cable is not properly connected to the PC or to the monitor
→ The stand-by Power management status is on due to missing H or V sync.
→ St.by condition due to missing 16 V (SMPS panel: X12-X20)

PROBLEM
No picture and the green LED lights-up
→ The PC is switched-off
→ Adjust brightness and contrast

Trouble shooting via LEDs on panels

PROBLEM
No picture and the front LED doesn't come on when the main power button is switched on
→ 2 LEDs on SMPS/EHT panel are off due to missing 210 V or 80 V (SMPS/EHT panel: X12- X20). It means that the SMPS overcurrent protection is activated because there is a short circuit on one of the supply rails.

PROBLEM
No picture and the front LED doesn't come on when the main power button is switched on
→ U317 LED on MAIN panel is off due to failure on vertical deflection. The MAIN panel is suspected to be failed.
→ U316 LED on MAIN panel is off due to failure on horizontal deflection. The main panel is suspected to be failed.

8.2 TROUBLE SHOOTING VIA ADJUSTMENT & DIAGNOSTIC PACKAGE (CM0900 TEST SOFTWARE)

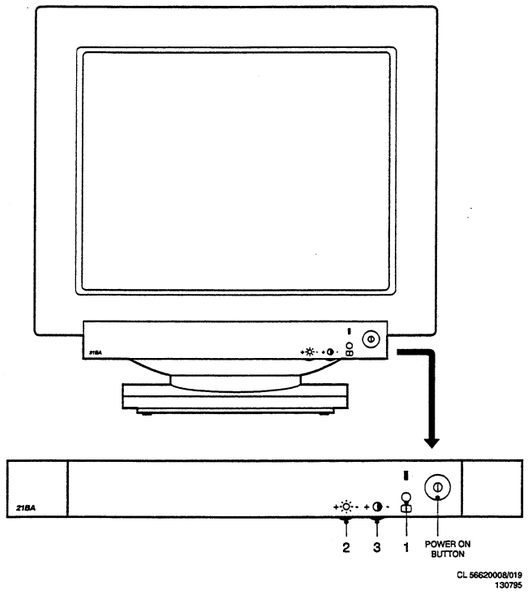
The CM0900 Test Software (installed in the Windows operating system), allows the user to perform diagnostic test off the PLL LOCK and the HARDWARE STATUS. This test, called 'HARDWARE DIAGNOSTIC' will be automatically perform during the start-up. The diagnostic test feature is also available on the menu of the CM0900 test software.

If the diagnostic test will found a failure one or more of the following messages will be displayed on the screen:

PLL UNLOCKED:	failure on 'phase lock' circuit. The Low level panel is suspected to be failure.
H. SYNC. OFF:	the horizontal sync. is not detected. The Video + Logic panel is suspected to be failure.
H. SYNC. OUT OF RANGE:	The horizontal sync. frequency is out of range. It means that the monitor doesn't recognise the horizontal frequency of your graphics board. Please verify that your graphic card operates within the 30-107 kHz range of your monitor.
V. SYNC. OFF:	the vertical sync. is not detected. The Video + Logic panel is suspected to be failure.
V. SYNC. OUT OF RANGE:	the vertical sync. frequency is out of range. It means that the monitor doesn't recognise the vertical frequency of your graphic board. Please verify your graphic card operates within the 50-170 Hz range of your monitor.
GENERAL FAILURE:	this means that at least two of the above mentioned failures have been detected at the same time. It can happen when a local failure cause a short circuit on one or more supply voltages, activating in this way the protection of the power supply so that also the non failed circuits cannot work or when the power supply itself is bad, or when a supply voltage is missing on the Main + Low level panel.
HORIZONTAL DEFLECTION FAILURE:	the Main + low level panel is suspected to be failure.
VERTICAL DEFLECTION FAILURE:	the Main + low level panel is suspected to be failure.
HIGH VOLTAGE AND DEFLECTION FAILURE:	the SMPS + EHT panel is suspected to be failure

9. Directions for use

Front controls

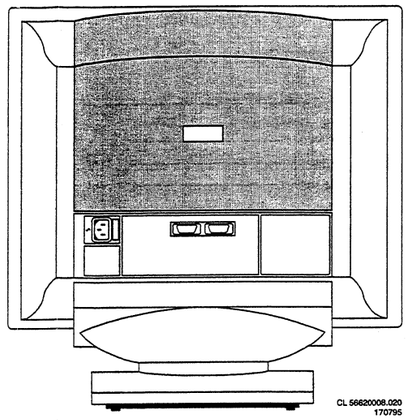


1 ⏻ :Manual Degauss button.

2 - ☼ + :Brightness control

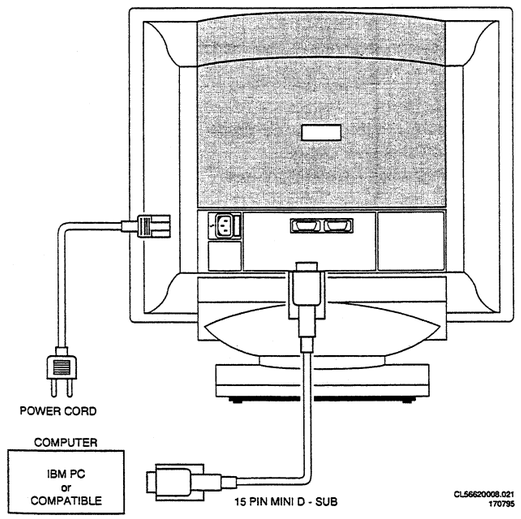
3 - ◑ + :Contrast control

Rear view

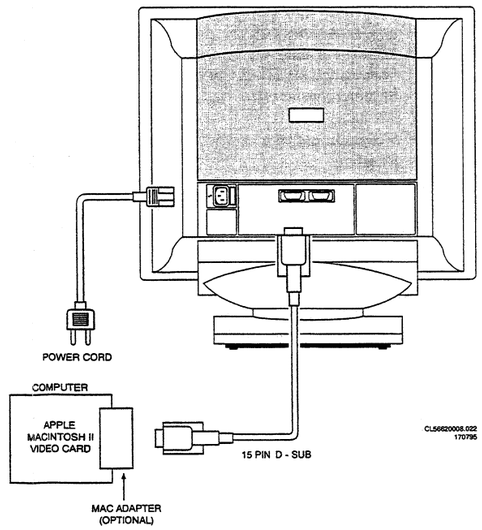


- Mini D-SUB 15 pin connector (video input)
- Mini D-SUB 9 pin connector (RS232 interface)
- Power cord connector

Connecting the monitor to an IBM or compatible with a normal VGA or high resolution graphics card



Connecting the monitor to an Apple computer with a MAC II video card



INTRODUCTION
This software is designed to give the user a simple, efficient and pleasant way to modify parameters. The following functions are activated using pop-up windows On Screen Display:

⇒ language set-up (can be defined only during the installation of the interactive software)
⇒ background set-up (only for Windows)
⇒ horizontal and vertical size
⇒ horizontal and vertical phase (position)
⇒ pincushion/barrel correction and balance
⇒ trapezoid correction and balance
⇒ tilt correction
⇒ colour temperature
⇒ degauss
⇒ global reset (factory reset values recall)
⇒ status (timing/resolution)

INTERACTIVE SOFTWARE FOR WINDOWS AND APPLE

INFORMATION
The program includes five Help features that provide on screen information and instructions (these helps are always available for selection at the bottom of the interactive software):

Help

- **"What is .. (Help) on/off"** - Information regarding the function of all the buttons will appear in the inner window
- **"How to .. (Help) on/off"** - Information window will drive the user step by step
- **"Table of contents (Help)"** - A window guide that, ordered according to the structure and panel layout of the software, containing the monitor function will be displayed
- **"Index (Help)"** - A window index containing the explanation about the interactive software functionality will be displayed
- **"Glossary of terms (Help)"** - A window glossary of specific monitor terms will be displayed

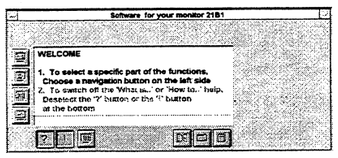
All the buttons are identified by a self explanatory icon:

Main buttons

"Undo change" - Cancel the last action.
"Done change" - Confirm an action or return to the main window picture.

Click on this icon to confirm an action.
Click on this icon to cancel an action.

WELCOME TO THE PHILIPS INTERACTIVE SOFTWARE


Software for your monitor 21B1
WELCOME
1. To select a specific part of the functions,
Choose a navigation button on the left side
2. To switch off the 'What is..' or 'How to..' help,
Deselect the 'i' button or the 'i' button
at the bottom

To go on you can use both the mouse/trackball or the keyboard:

⇒ *mouse or trackball: position the arrow over the icon and click on the left icon*
⇒ *keyboard: press TAB to select an icon and then press ENTER or RETURN*

CHANGE START-UP AND BACKGROUND
To change the start up setting and the window background click on this Preference button on the bottom of the window

Follow these instructions to change the background of the pop-up window (two different backgrounds are available):

Background

1. Click on the 'Windows background' icon.

2. Two buttons appears on the right side: choose between one of the backgrounds: 'water and solid '.

3. Click on the 'done' icon.
4. Click on the 'ok' icon.

If you need to change the background click on the 'windows background' and repeat the above steps.

Start-up setting

This feature allows the user to set-up the first window that appears on the screen at each start-up:

1. Click on the 'start-up' navigation icon.

2. Click on one of the following icons : 'Image geometry control', 'Image quality control', 'Monitor behaviour control', 'Information on all current setting' or 'Window background'.
3. Click on the 'Done' icon.

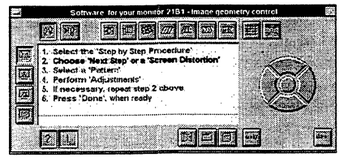
NAVIGATION BUTTONS

To select a specific part of interactive software, choose one of the four navigation buttons on the left side of the window:

- Image geometry control.
- Image quality control.
- Monitor behaviour control.
- Information on current setting .

IMAGE GEOMETRY CONTROL

Click on the 'Image geometry control ' icon. This picture appears on the screen.


Software for your monitor 21B1 - Image geometry control
1. Select the 'Step by Step Procedure'
2. Choose 'Next Step' or a 'Screen Distortion'
3. Select a 'Pattern'
4. Perform 'Adjustments'
5. If necessary, repeat step 2 above
6. Press 'Done', when ready

Step by step procedure

Follow these instructions to adjust the deviation of the reproduced picture:

1. Click on the 'Step by step procedure' icon to enable you to adjust the screen image geometry distortions, one by one, in a factory defined sequence.
2. Click on the 'Next step selection' icon, now the first adjustment button is selected :
   - size of the screen: enlarges or reduces the screen size
3. To properly adjust the screen, two geometry patterns can be displayed by clicking on one of the icons shown on the left. click on the selected icon to return to the previous screen.

   To display the full screen geometry pattern, simultaneously press the ALT+TAB keys.
   Press the ALT+TAB or the mouse left button to return to the previous screen.
4. Click on one of the following icons as many times as necessary to properly adjust the screen size:

If you click on the central icon you can change the speed of the control adjustments from 'slow' to 'fast'.

to enlarge the vertical size

 to enlarge the horizontal size

to reduce the horizontal size

 to reduce the vertical size

Directions for use

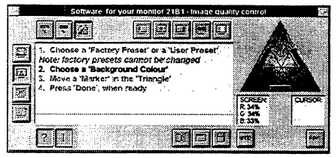
5. Click on the 'done' icon.

6. Click on the 'Next step selection'. The next screen icon adjustment (see the list below) will be selected. Then repeat steps 3 - 4 - 5 - 6.

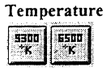
Note: With the next geometrical adjustments, different kinds of adjustment icons will be displayed:

- shift: to move the position of the screen in the top/bottom or left/right direction
- tilt balance: to adjust the tilt of the image
- parallelogram: to balance the position of the top and the bottom
- trapezoid: to balance the width of the top and the bottom of the screen
- symmetry: to align the screen in one direction
- pincushion: to align the pincushion distortion

IMAGE QUALITY CONTROL
After clicking on the 'image quality control icon', this picture appears on the screen.


Software for your monitor 21B1 - Image quality control
1. Choose a 'Factory Preset' or a 'User Preset'
Note: factory presets cannot be changed
2. Choose a 'Background Colour'
3. Move a 'Marker' in the 'Triangle'
4. Press 'Done', when ready
SCREEN:
R: 34%
G: 34%
B: 33%
CURSOR:

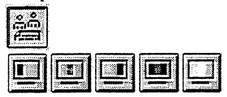
Factory Preset Colour Temperature

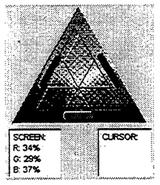


Follow these instructions to change the White (Colour) temperature.

1. Click on '9300°K' or '6500°K' icons to change the colour temperature.
2. Click on the 'done' and the 'ok' icons.

User Preset Colour Temperature





Under the colour *chart (triangle) the percentages related to every colour will be displayed.*

---

1. Click on the 'user defined colour temperature' icon.

2. To properly define a user colour temperature, choose one of the 'background colours'.

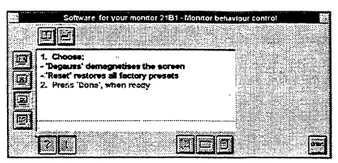
To display a full background colour pattern, press the ALT+TAB keys at the same time.
Press the ALT+TAB or the mouse left button to return to the previous screen.

3. Move the colour bar (with the mouse or the keyboard arrows) into the colour chart until to select the White colour temperature .

Under the Colour chart (triangle) the percentages related to every colour will be displayed..

4. Click on the 'done' and 'ok' icons.

MONITOR BEHAVIOUR CONTROL
After clicking on the 'Monitor Behaviour Control' icon, this picture appears on the screen.


Software for your monitor 21B1 - Monitor behaviour control
1. Choose:
- "Degauss" demagnetises the screen
- "Reset" restores all factory presets
2. Press "Done", when ready
Done

Degauss

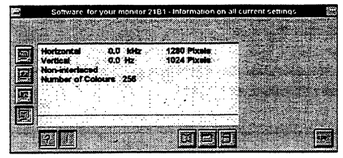
Following these instructions to demagnetize the screen and reset (restore) all the factory presets:

1. Click on the 'Degauss' icon : the screen surface will be demagnetized.

Reset

1. Click on the 'Reset to factory preset' icon: all the changed values will be cancelled.
2. Click on 'done'icon.

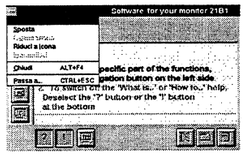
INFORMATION ON CURRENT SETTING
After clicking on the "Information on current settings" icon, information regarding the settings of the working video graphic card will be displayed in this window picture


Software for your monitor 21B1 - Information on all current settings
Horizontal 0.0 kHz 1280 Pixels
Vertical 0.0 Hz 1024 Pixels
Non-interlaced
Number of Colours 256

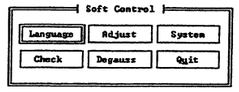
These parameters indicate the performance capabilities of the device driver or video board.

HOW TO LEAVE

Click on the upper left icon of the window and choose 'exit'.



INTERACTIVE SOFTWARE FOR DOS



To continue, you can use the mouse or the keyboard as indicated

If you press SHIFT + arrow key, you will change the position of the displayed window.

⇒ *mouse: position the arrow over the selected icon and click on the mouse's left button*

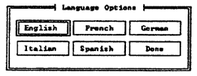
⇒ *keyboard: press TAB to select a button and then press ENTER or RETURN*
or
press the key corresponding to the highlighted letter (L=Language, A=Adjust, ...)

Press one of the following buttons to:

Language	1. open the languages window
Adjust	2. open the screen image and geometry control windows
System	3. open window regarding information and changing on the current setting
Check	4. call patterns menu
Degauss	5. demagnetize the screen surface
Quit	6. exit the DOS interactive software

SELECT YOUR LANGUAGE

Follow these instructions to select your language

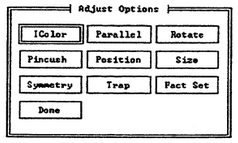


1. Choose between one of the five displayed languages.

   Use the TAB keyboard button and press ENTER or position the arrow over the select icon and click the mouse's left button.

2. Click on the ' Done' icon to return to the main window.

IMAGE AND SCREEN GEOMETRY CONTROL

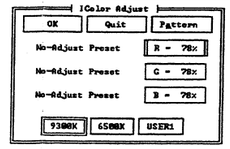


Press one of the following icons to :

Icolor	⇒ change the white colour temperature
Parallel	⇒ adjust the parallelogram deviations
Rotate	⇒ adjust the rotation deviations
Pincush	⇒ align the pincushion deviations
Position	⇒ change the position of the screen
Size	⇒ adjust the screen size
Symmetry	⇒ align the symmetry of the screen
Trap	⇒ balance the dimension of the top and the bottom of the screen
Fact Set	⇒ restore the factory set-up
Done	⇒ return to the main menu

IMAGE CONTROL

After clicking on the 'Icolor' icon, this picture appears on the screen.



Factory Pre-set Colour Temperature

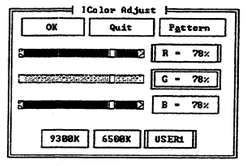
9500°K
6500°K
OK

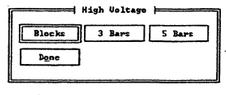
1. Click on '9300°K' or '6500°K' icons to change the colour temperature.
2. Click on the 'OK' icon.

The percentages of the Red, Green and Blue will be indicated.

User Pre-set Colour Temperature

After clicking on the 'USER' icon this picture appears on the screen.

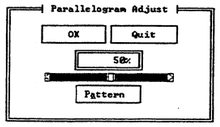




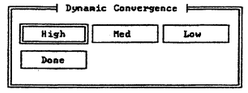
1. Click on 'USER' icon to define a user colour temperature
2. Click on the 'PATTERN' icon and choose one of the available backgrounds.
3. Select one colour (R or G or B) and by using the arrows keys change the percentage of this colour. If needed repeat this step for the other colours.
4. Click on the 'OK' icon.

SCREEN GEOMETRY CONTROL

After clicking on the 'Parallel' icon this picture appears on the screen.



Adjust Parallelogram Deviation

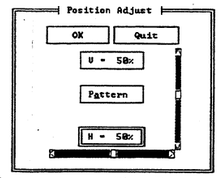


1. Click on the 'PATTERN' button and select a pattern (the Dynamic Convergence window appear on the screen).
2. Select the central icon and adjust the picture by moving the cursor with the keyboard arrow buttons.
3. Click on the 'OK' icon.

Adjust Pincushion - Rotation - Symmetry and Trapezoidal Deviation

For the other geometrical adjustments repeat the above steps 1 - 3

After clicking on the 'Position' icon this picture appears on the screen.



Change the position of the screen

1. Press the 'PATTERN' icon and select a pattern (the Dynamic Convergence window appear on the screen).
2. Select the 'H' or the 'V' icon and adjust the picture by moving the cursor with the keyboard arrow buttons.
3. Press the 'OK' icon.

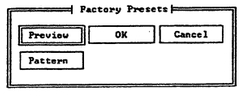
Adjust the Screen Size

Repeat the previous steps 1 - 3 .

Directions for use

Restore Factory Set-up

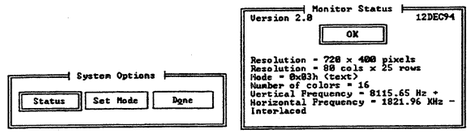
This feature allows you to restore the geometri-cal factory set-up.



1. Click on the "PATTERN" icon and choose a pattern.
2. Click on the 'PREVIEW' icon to see the geometrical factory set-up adjustment.
3. Click on the 'OK' icon to restore the factory set-up, or
4. Click on the 'CANCEL' icon in case you prefer your set-up.

INFORMATION AND CHANGING OF THE CURRENT SETTING

After clicking on the 'System' icon, this picture appears on the screen.



Current setting

Click on the 'STATUS' icon: a picture containing information regarding the setting of the working video graphic card will be displayed

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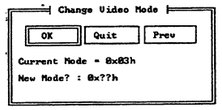
Change the video mode

Click on the 'SET MODE' icon: this picture appears on the screen.

This feature allows you also to recall one of the previously used video modes.



The 'Prev' feature is operative if you had change the AUTOEXEC.BAT file during the installation procedure (see page 24).
However you can install now a temporary file following this instruction (or you can reinstall the DOS INTERACTIVE SOFTWARE):

- type-in : **C:\CD SCONTROL\SAVER**

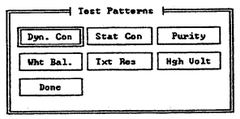
The video mode numbers are correspondence to the DOS standard video mode

1. Click on the 'PREVIOUS' icon, all the used mode appears on the screen.
2. Write one of the displayed modes.
3. Click on the 'OK, icon.

PATTERNS MENU

Click on the 'CHECK' icon, this picture appears on the screen.

To properly adjust the screen the user can display up to 19 different patterns.



1. Choose between one of the above 6 icons and click on, other window will be displayed.
2. Choose again between one of the displayed icons.
3. To exit press one key and after the 'DONE' icon.

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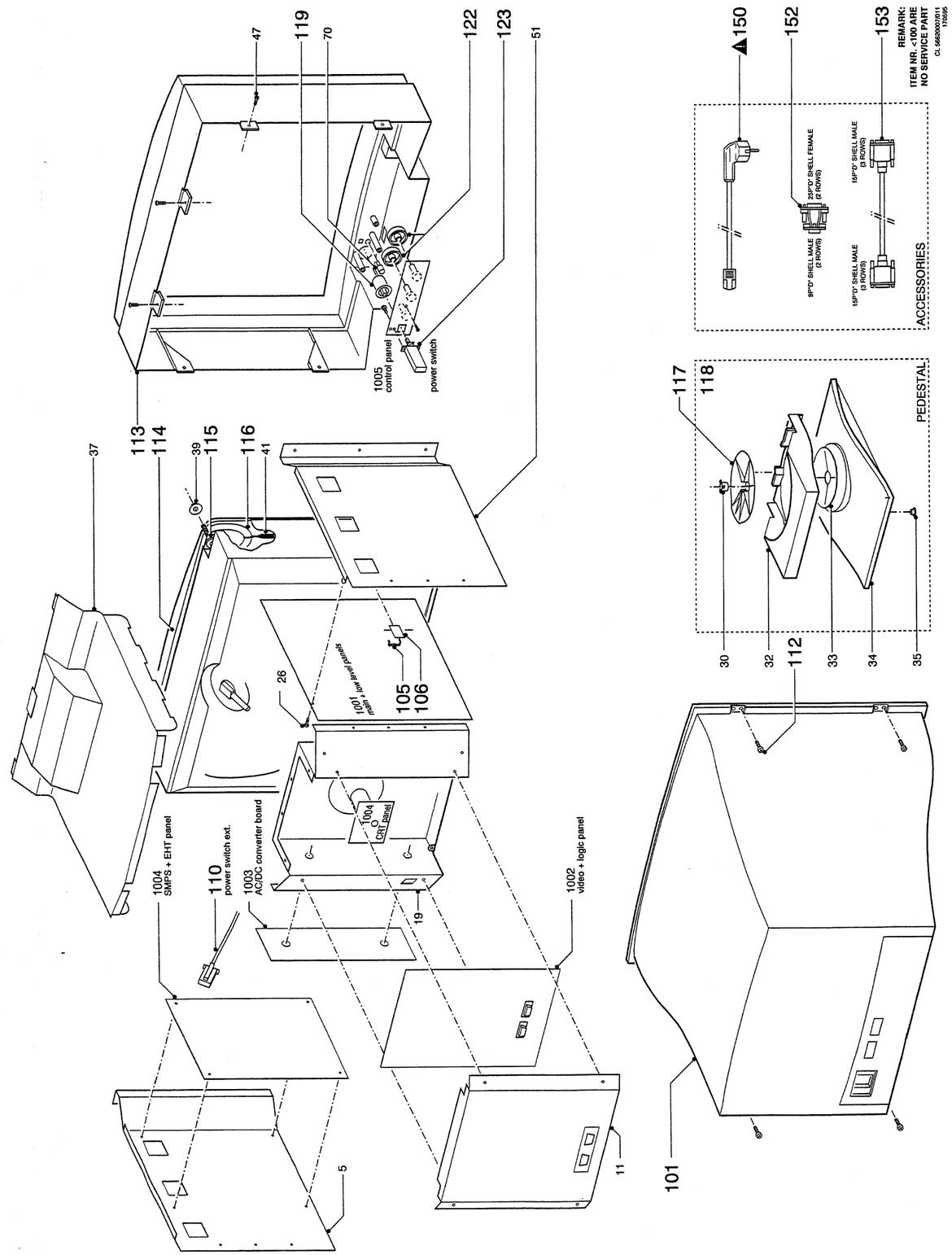
10. Exploded view



Spare parts lists

Central repair procedure

This chassis contains one or more Printed Wiring Boards (PWBs) or assemblies, which can be repaired centrally via the so called "central repair procedure".
These assemblies are marked with "**R**" in spare parts list.
The central repair procedure has been introduced to guarantee a fast, efficient and correct repair of assemblies with complex circuitries or built according new technologies.

Central Repair Procedure:

Contact your local service organisation for a resend request.
After confirmation a replacement assembly will be sent to you.
Send the defective assembly inclusive a "(standard) repair form" to your local service organisation.
The defective assemblies should be correctly packed inclusive ESD protecting material. The original packing of the returned/replacement assembly can be used for this purpose.

The accompanying "repair form" should contain all basic information such as:
- full name and address of the sender
- service code of the assembly
- model and/or type number of the assembly
- full model number of the set
- serial number/production code of the set
- description of the failure including timing indication (immediate, after ... minutes warming up, sometimes)

For this purpose you can make use of a standard repair form: ordering code 4822 727 20133 (packing quantity 10 pieces).

R = Assembly to be repaired via the central repair procedure.

REPAIRABLE PRINTED WIRING BOARDS

1001	**R**	4822 212 31995	Main + low level panels
1002	**R**	4822 212 31993	Video + logic panel
1004	**R**	4822 212 31997	SMPS+EHT + CRT panels

OTHER PRINTED WIRING BOARDS

1003	4822 212 31996	AC/DC converter panel
1005	4822 212 31994	Control panel

PARTS NOT ON PWB's
(See exploded view)

101	4822 438 10492	Rear cover
105	4822 492 71122	Spring clip
106	4822 466 93141	Thermal insulator
110	4822 403 70975	On/off extension
112	4822 502 30076	Screw 3.5 x 16
113	4822 451 21046	Front mask assy
114	▲ 4822 131 20665	Picture tube M51LCJ180X67
115	4822 505 11188	Nut with washer M6
116	▲ 4822 157 70018	Degaussing coil
117	4822 466 93301	Friction disc
118	4822 462 10562	Pedestal assy
119	4822 410 62817	On/off button
122	4822 410 62815	Control knob
123	4822 272 20079	Power switch (Mechanical)

KEY COMPONENT ON AC/DC CONVERTER PANEL

F001	▲ 4822 253 50145	Fuse T3.15A/250V

KEY COMPONENT ON SMPS + EHT PANEL

F001	▲ 4822 253 30473	Fuse 4A/125V

SOFTWARE (AVAILABLE ON FLOPPY DISK)

4822 900 10673	Firmware on floppy disk

ACCESSORIES

150	▲ 4822 321 10676	Power cord EUR
150	▲ 4822 321 10978	Power cord USA
152	4822 263 50235	RS232 Adaptor
153	4822 321 63013	I/F cable
	4822 263 50215	Switchable Adaptor Mac
	4822 219 82808	Service RS232 Adaptor